 Hard Handoff: "Break-before-make" switch between cells; disconnects from one before connecting to another.

 Soft Handoff: "Make-before-break" switch; connects to new cell before disconnecting from the old one.

Handoff: The process of transferring an active call or data session from one cell to another without interruption.

- **Types**:
  - **Hard Handoff**: Breaks connection with the current cell before connecting to the new one.
  - **Soft Handoff**: Maintains connections with both cells during the transition.

 Co-Channel Interference: Interference from neighboring cells using the same frequency.

 Adjacent Channel Interference: Interference from signals in nearby frequency bands.

In telecommunications, a **channel** refers to a medium or pathway through which signals are transmitted. Key points include:

- **Types of Channels**:
  - **Voice Channel**: Carries voice signals for communication.
  - **Data Channel**: Transmits data signals for computer or internet communications.
  - **Control Channel**: Carries signaling information to manage communication sessions and network functions.
- **Characteristics**:

    - **Bandwidth**: The range of frequencies a channel can carry, determining the amount of data transmitted.
    - **Capacity**: The maximum data rate the channel can support.
- **Usage**: Channels can be physical (like wires and fibers) or logical (like frequency bands and time slots in multiplexing). They are essential for establishing communication between devices in a network.

 Trunking & GoS: Trunking maximizes resource use by sharing channels, with Grade of Service (GoS) indicating call-blocking probability.

 Set-Up Time: Time needed to establish a connection.

 Holding Time: Duration a call is active.

 Traffic Intensity: Measure of network load, often in Erlangs.

 Load: Total network traffic volume.

 Request Rate: Frequency of call requests.

 Cell Splitting: Dividing cells to increase capacity.

 Sectoring: Using directional antennas to split a cell into sectors, reducing interference.

 Radio Wave Propagation: Transmission behavior of radio waves across various mediums.

 Space Propagation Models: Models predicting signal behavior over space.

 Basic Propagation Mechanisms: Includes reflection, diffraction, and scattering.

 Reflection: Waves bounce back from a surface.

 Diffraction: Waves bend around obstacles or openings.

 Scattering: Waves spread in different directions due to particles or irregularities.

 1 Erlang: Represents continuous use of one channel for one hour (full utilization of one channel).

 0.5 Erlangs: Indicates that one channel is utilized for half the time (on average, two calls can be handled, each lasting half the time of the channel's availability).

 Cluster: A group of interconnected servers or devices working together.
 Load Balancing: Distributes workloads for optimized resource use.
 High Availability: Provides redundancy; if one server fails, others take over.
 Scalability: Allows easy addition of servers to handle increased loads.
 Types:

- Compute Clusters (high-performance computing)
- Storage Clusters (large data management)
- Database Clusters (distributing database loads)

 Voice Channel: A communication path for transmitting voice signals; used for actual voice calls in telecommunication systems.
 Control Channel: A communication path for transmitting signaling information; used to manage and control the setup and termination of voice channels and other network functions.

n telecommunications, a **cell** refers to a specific geographic area covered by a cell tower or base station in a mobile network. Key points include:

- **Cellular Network**: Composed of multiple cells, allowing efficient frequency reuse and coverage.
- **Cell Types**:
  - **Macro Cell**: Covers a large area and provides wide-ranging coverage.
  - **Micro Cell**: Covers a smaller area, typically used to enhance capacity in high-density regions.
  - **Pico Cell**: Covers an even smaller area, often used indoors or in specific locations.
- **Handovers**: As a mobile device moves, it can switch from one cell to another for continuous service.
- **Frequency Reuse**: Different cells can use the same frequency channels, maximizing spectrum efficiency.

 Base Station: Provides wireless coverage to a cell and connects mobile devices to the network.

 MTSO (Mobile Telephone Switching Office): Manages connections, handoffs, and routing for calls within a mobile network.

 Roamer: A mobile user who is accessing a network outside their home network area.

 1G, 2G, 2.5G, 3G:

- **1G**: Analog voice-only network.
- **2G**: Digital network with SMS support.

- **2.5G**: Intermediate step with limited data capability (e.g., GPRS).
- **3G**: Higher-speed data with multimedia support.

 Frequency Reuse: Technique to use the same frequencies in different cells, reducing interference.

 Handoff: Transition of a call or data session between cells.

 Channel Allocation Techniques: Methods to assign frequency channels to users, like Fixed, Dynamic, or Hybrid allocation.

 Cellular Network: A wireless communication network divided into cells, each covered by a base station.

 AMPS (Advanced Mobile Phone System): First-generation analog cellular technology.

 Sectoring: Splitting a cell into sectors to improve capacity and reduce interference.

- **Mobile IP**: Protocol allowing seamless movement across networks.
- **WML (Wireless Markup Language)**: Used to display content on wireless devices.

 Paging: Process to alert a mobile device of an incoming call.

- **Cordless Telephone**: Wireless phone with limited range, usually for home use.

 Path Loss Model: Predicts signal loss over distance due to obstacles and other factors.

 Capacity Expansion: Techniques to increase network capacity, like cell splitting and frequency reuse.

 Spread Spectrum: Signal transmission technique that spreads signals over a wide frequency band, reducing interference.

 Other Key Terms:

- **Control Channel**: Manages network instructions (e.g., setup calls).
- **Forward Channel**: Channel from base station to mobile device.
- **Full Duplex System**: Allows simultaneous two-way communication.
- **Half Duplex System**: Only allows one-way communication at a time.
- **Mobile Station**: User's device in the network.
- **Mobile Switching Center (MSC)**: Manages switching between base stations.
- **Simplex System**: One-way communication only.
- **Subscriber**: A registered user in the network.
- **Transceiver**: Device capable of both transmitting and receiving.